THE ECONOMY AND NUTRITIVE VALUE OF DIFFERENT CUTS OF LAMB OF DIFFERENT GRADES

BY

JAMES DILLON KEMP

B.S., University of Kentucky, 1948
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AN ABSTRACT OF A THESIS
SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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THE ECONOMY AND NUTRITIVE VALUE OF DIFFERENT CUTS OF LAMB OF DIFFERENT GRADES

The economy and nutritive value of different cuts of meat have been of much interest for many years. At present the cost of meat is the largest single item in the total food cost for the average American family. With so much of the food dollar going for meat it is important to know the economy and nutritive value of different cuts of different species and grades. With this knowledge, a better job of planning meals and balancing the food budget can be accomplished.

On April 30, 1951, new official U. S. D. A. standards ('51) for grades of lamb, yearling mutton, and mutton carcasses became effective. On May 7, 1951, an O. P. S. regulation ('51) became effective making Federal grading mandatory for beef, veal, calf, lamb, yearling mutton, and mutton carcasses and wholesale cuts. Quantitative data regarding the economy and nutritive value of different cuts of lamb of different grades have never been adequate. Very few data have been published since these regulations were promulgated.

The purpose of this study, therefore, was to acquire quantitative data regarding the economy and nutritive value of carcasses and cuts of lamb of different grades produced from Western range-type lambs as this is the most important type of market and feeder lamb in this country.

Forty-seven wether lambs, ranging in weight from 70 to 119 pounds, including forty-five Western, range type, black-face lambs and two purebred Hampshire lambs were slaughtered. The two Hampshire lambs produced High Prime carcasses and were included for contrast only. The Western lambs produced 10 Prime, 13 Choice, 11 Good, and 11 Utility carcasses. Dressing percentages were determined using shorn live weights and cold dressed weights. The carcasses were divided into halves and the right halves were used for physical and chemical analyses. The halves were cut in a uniform manner and cutting percentages were determined. Each cut was separated into fat, lean, and bone and the percentages were determined. Edible meat (fat plus lean) was calculated.

Samples of fat and lean from each leg, loin, rib, and shoulder were analyzed for moisture, dry matter, protein, and ether extract. Percentages were calculated on the fresh and dry bases for protein and ether extract. Similar calculations were made for dry matter,

Table 1
Summary of Results

GRADE	Prime	Choice	Good	Utility
No. of carcasses	10	13	11	11
Dressing percentages	53.9	50.5	50.7	47.1

Cutting percentages

	Leg	Loin	Rib	Shoulder	Breast and Flank	Fore Leg	Neck
Prime	30.1	10.0	8.4	23.2	15.4	3.3	3.6
Choice	31.4	9.3	7.2	23.8	15.6	3.4	4.0
Good	31.5	9.3	7.4	24.6	14.1	3.6	4.2
Utility	31.3	9.0	7.4	24.5	13.7	4.2	4.5

Physical Composition of Carcasses and Cuts

	Carcass	Leg	Loin	Rib	Shoulder	Breast and Flank	Fore Leg	Neck
Prime								
Fat %	33.2	23.6	36.9	41.9	28.1	47.6	21.4	28.4
Lean %	50.8	62.4	51.9	43.7	57.5	41.2	50.9	50.8
Bone %	14.0	12.8	10.0	12.9	12.1	8.4	27.1	20.1
Choice								
Fat %	26.7	18.7	29.0	29.4	23.5	42.6	17.4	22.1
Lean %	54.3	65.3	57.5	49.5	59.7	43.7	52.3	53.0
Bone %	16.5	14.8	11.4	18.7	14.3	10.6	29.6	22.5
Good								
Fat %	23.4	16.2	24.6	25.7	21.3	38.6	15.4	19.5
Lean %	55.9	66.5	59.7	51.8	60.2	47.1	52.2	54.9
Bone %	18.0	15.9	13.5	19.7	15.5	11.3	31.3	23.4
Utility								
Fat %	19.7	14.2	19.3	21.3	19.1	33.1	13.4	16.4
Lean %	56.5	66.6	61.1	52.0	60.8	49.8	52.6	53.3
Bone %	21.5	18.0	18.0	24.8	18.2	14.1	33.1	28.8

Chemical Composition and Physiological Fuel Value of the Primary Cuts

	Leg	Loin	Rib	Shoulder
Prime				
Protein %	13.7	12.2	10.0	12.2
Ether Extract %	21.6	33.7	39.2	26.2
Fuel Value, Cal./100 gms.	254	355	396	290
Choice				
Protein %	14.7	13.3	11.5	12.4
Ether Extract %	17.1	25.6	26.7	21.4
Fuel Value, Cal./100 gms.	217	292	294	246
Good				
Protein %	14.7	13.8	11.6	12.6
Ether Extract %	14.2	21.7	23.8	18.4
Fuel Value, Cal./100 gms.	191	253	264	217
Utility				
Protein %	14.4	14.4	11.9	12.7
Ether Extract %	12.1	14.8	17.6	16.2
Fuel Value, Cal./100 gms.	169	194	211	199

ether extract, and protein in edible meat. The percentages of ether extract and protein in the fresh cuts were calculated.

Gross energy and physiological fuel values were calculated as Calories per 100 grams on the fresh and dry bases for fat, lean, and edible meat and as Calories per 100 grams of cut.

Nomographic charts were made to determine the economy of cuts based upon the percentage of separable lean and the percentage of edible meat in all cuts, and the percentage of protein in the legs, loins, ribs, and shoulders.

Analysis of variance was used to test the significance of differences among all grades and the "t" test was used to test significance between grades.

Table 1 summarizes some of the most important results.

CONCLUSIONS

Under the conditions of this experiment the following conclusions seem justified:

1. Dressing percentages decrease with a decrease in grade.

2. Cutting percentages are affected by grade. The percentage of leg tends to increase slightly with a decrease in grade; however, the differences between grades are not significant. The percentages of loin, rib, breast and flank, and kidney fat decrease with a decrease in grade; whereas the percentages of shoulder, neck, fore leg, kidney, hind shank, and fore shank increase with a decrease in grade.

3. There is a decrease in the percentage of fat and edible meat and an increase in the percentage of lean and bone in the carcasses and cuts as the grade decreases. An exception occurs in the fore leg where there is no difference in the percentage of lean due to grade. Although the over-all differences are significant there may be no significant differences between certain grades.

4. Grade has no significant effect upon the percentage of protein in the fresh lean of the primary cuts; however the percentage of protein increases with a decrease in grade in the dry lean. Exceptions may occur so that adjacent grades are similar.

5. The percentage of protein in the fresh and dry fat and fresh and dry edible meat increases with a decrease in grade.

6. The percentage of edible protein in the primary cuts usually increases with a decrease in grade although there are no significant

differences in the shoulder due to grade and no significant differences among Choice, Good, and Utility grades of legs, loins, and ribs.

7. The percentage of dry matter in the lean, fat, and edible meat of the primary cuts decreases with a decrease in grade.

8. As the primary cuts decrease in grade the percentage of ether extract decreases significantly in the fresh and dry fat, fresh and dry edible meat, and fresh cut. There is usually a tendency for the percentage of ether extract to vary similarly in the fresh and dry lean; however there are significant differences only between Prime and Utility and/or Choice and Utility.

9. The differences in the percentages of fat in the carcasses are significant or highly significant between adjacent grades and between High Prime and Prime. Therefore, if the official grades are to be based primarily upon carcass finish an additional grade should be included to include those super-finished carcasses.

10. Physiological fuel values follow the same trends as ether extract. As the grade decreases the fuel values per unit of weight decrease in fresh and dry fat, fresh and dry edible meat, fresh cut, and in some cases between the fresh and dry lean. However, the only significant differences in fresh and dry lean appear to be between Prime and Utility and/or Choice and Utility cuts.

11. If there is no difference in the price per pound of the same cut of different grades, in most cases the cuts from each successively lower grade are more economical when the percentage of lean is used as the criterion of economy. However, as the prevailing prices per pound of cut decrease as the grades decrease, the economy is further exaggerated in favor of each successively lower grade.

12. If there is no difference in the price per pound of the same cut of different grades, there is little difference in the economy of Choice, Good, and Utility cuts when the percentage of protein is used as the criterion of economy. The Prime cuts are less economical. However, due to prevailing prices, the cuts of each successively lower grade are more economical.

13. If there is no difference in the price per pound of the same cut of different grades, in most cases each successively lower grade is less economical when the percentage of edible meat is used as the criterion of economy. However, the economy of cuts purchased on this basis will depend upon the prevailing variation of prices among the grades.

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VITA

James Dillon Kemp was born near Pickett, Adair County, Kentucky, February 6, 1923, and received his elementary education in the Adair County public schools. He attended Columbia High School, Columbia, Kentucky, and graduated as valedictorian in 1942.

In February, 1943, he was inducted into the armed forces and served as a navigator with the 15th Air Force in Italy. He was released from active duty in November, 1945.

He enrolled in the University of Kentucky in January, 1946, graduated with high distinction, and received the degree of Bachelor of Science in Agriculture in August, 1948. He enrolled in the Graduate College of the University of Kentucky in September, 1948, and received the degree of Master of Science in August, 1949.

Since September, 1949, he has been enrolled in the Graduate College of the University of Illinois and has been serving as a Graduate Assistant in Animal Science. He has pursued work toward the degree of Doctor of Philosophy in Animal Science with minors in Animal Nutrition and Physiology.

On December 21, 1947, he was married to Miss Helen Walker, Columbia, Kentucky. They have one daughter, Bonnie Kay.